

**REMARKS**

Claims 19-31 and 33-45 are pending in the instant application. New Claims 41-45 find support in the specification at the following locations: for Claim 41, Page 56, Line 26 to Page 57, Line 9; Claim 42, Page 14, Lines 15-16; for Claim 43, Page 14, Lines 15 to 26; for Claim 44, Page 37, Lines 24 to 27; for Claim 45, Page 36, Line 6 to Page 37, Line 27. Accordingly, no new matter is introduced by this amendment. The claim amendments are presented in a revised format per the USPTO's announcement 'Amendments in a Revised Format Now Permitted', signed 31 January 2002, and accordingly do not conform to the current reading of 37 C.F.R. §1.121, which Applicants understand has been waived. Accordingly, a complete listing of all claims that are, or were in the application, along with an appropriate status identifier, is provided above in the section entitled "Amendments to the Claims". Markings are provided on the claims amended in the present amendment.

**Claim Rejections**

**A. 35 U.S.C. § 112, Second Paragraph**

Claims 19-21, 25, 30-31 and 33-34 stand rejected under § 112, second paragraph, as lacking sufficient antecedent basis for the recitation, "said electrode further comprise a passivation agent monolayer." In light of the amendment presented above, Applicants respectfully request withdrawal of this rejection.

Claims 19-21, 25, 30-31 and 33-34 stand rejected under § 112, second paragraph, as lacking sufficient antecedent basis for the recitation, "said first and second measuring electrode."

In light of the amendment presented above, Applicants respectfully request withdrawal of this rejection.

Claims 20-25, 30-31 and 33-34 stand rejected under § 112, second paragraph, as lacking sufficient antecedent basis for the recitation, "said electrode further comprise a passivation agent monolayer." In light of the amendment presented above, Applicants respectfully request withdrawal of this rejection.

Claim 21 stands rejected under § 112, second paragraph, as unclear in the recitation, "further comprising: d)" as the claims it depends from only recited a) and b). In light of the amendment presented above, Applicants respectfully request withdrawal of this rejection.

Claims 22 stand rejected under § 112, second paragraph, as lacking sufficient antecedent basis for the term "said AC voltage source." In light of the amendment presented above, Applicants respectfully request withdrawal of this rejection.

Claims 27-31 stand rejected under § 112, second paragraph, as lacking sufficient antecedent basis for the term "said single stranded nucleic acid." In light of the amendment presented above, Applicants respectfully request withdrawal of this rejection.

Claims 27-31 stand rejected under § 112, second paragraph, as lacking sufficient antecedent basis for the term "said electrode." In light of the amendment presented above, Applicants respectfully request withdrawal of this rejection.

**B. 35 U.S.C. § 102(e)**

Claims 19, 21, 22, 35, 36, 39 and 40 stand rejected under 35 U.S.C. §102(e) as being anticipated by Heller et al (U.S. Patent No. 5,849,486). Heller et al. reports a method for concentrating and reacting analytes at specific microlocations (Column 11, Lines 9-11). This is accomplished by using electrophoretic forces to transport charged compounds (Column 10, Lines 25-33). This method uses electrodes covered by a permeation layer (Column 12, Lines 26-27). The permeation layer precludes DNA from contacting the electrode directly (Column 10, Lines 6-9). The purpose of the permeation layer is to allow passage of ions sufficient for electrophoresis but to prevent the destruction of the nucleic acids attached to the outer surface of the permeation layer. Thus, a permeation layer that shielded the electrode from the solvent would be inoperative. The permeation layer can be formed using materials such as metal oxides, ceramics, carbon polymers and glass (Column 12, Lines 27-31, and Column 17, Line 64 to Column 18, Line 6).

The claims of the instant application are directed to apparatus for the detection of target nucleic acids in test samples. At a minimum, the claimed invention, as currently amended, is comprised of a test chamber with a first and a second electrode, a single stranded nucleic acid covalently attached to one of the electrodes via an insulator, a passivation agent monolayer, and an AC/DC voltage source connected to the electrodes.

In making the instant 102(e) rejection the Examiner has equated the permeation layer disclosed in Heller et al. with the passivation agent monolayer of the claimed invention.

However, the two are readily distinguishable. In particular, the passivation agent monolayer of

the instant application is not inter-molecularly polymerized and thus forms a layer a single monomer thick. As stated in the specification,

The passivation agent monolayer facilitates the maintenance of the nucleic acid away from the electrode surface. In addition, a passivation agent serves to keep charge carriers away from the surface of the electrode. Thus, this layer helps to prevent electrical contact between the electrodes and the electron transfer moieties, or between the electrode and charged species within the solvent. Such contact can result in a direct "short circuit" or an indirect short circuit via charged species which may be present in the sample. Accordingly, the monolayer of passivation agents is preferably tightly packed in a uniform layer on the electrode surface, such that a minimum of "holes" exist.

See Page 35, Line 21 to Page 36, Line 3.

The permeation layer described in Heller et al., on the other hand, is inter-molecularly polymerized, and therefore not a uniform layer. For example, at Column 18, Lines 19-30, Heller et al. describe the production of a "mesh-type" permeation layer using polymerized acrylamide monomers. Such inter-molecular polymerization of the acrylamide monomers, as well as any of other disclosed monomers, is necessary to form the sieve-like structure required for Heller et al's system to function.

For an anticipation rejection under 35 U.S.C. §102(e) to be proper, a single reference must expressly or inherently disclose each and every element of a claim. *In re Paulsen*, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994); MPEP § 2131 (citing *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). As discussed above, Heller et al. does not recite the claimed passivation monolayer. Accordingly, Heller et al. does not meet each and every element of the instant claims as no monolayer is provided and withdrawal of this rejection is respectfully requested.

Claims 19-31 and 33-40 stand rejected under 102(e) as anticipated by Kayyem et al., U.S. Patent No. 6,096,273. Kayyem et al. is directed to compositions of nucleic acids covalently coupled to electrodes via conductive oligomers, as well as methods of making such compositions. As discussed above, the instant claims are directed to apparatuses wherein nucleic acids are attached to electrodes via insulators. Kayyem et al. does not explicitly teach the use of such insulators for nucleic acid attachment. As Kayyem et al. does not teach each and every limitation of the instant Claims, withdrawal of the 102(e) rejections to claims 19-31 and 33-40 is respectfully requested.

### **C. Double Patenting**

#### U.S. Patent No. 6,096,273

Claims 19-31 and 33-40 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-34 of U.S. Patent 6,096,273. Applicants respectfully traverse the propriety of the rejection. In particular, the Examiner has relied on passages of the cited patent as prior art to teach additional components to be combined with the claims of the patent to render the instant claims obvious. As stated in the MPEP at § 804(II)(B)(1), "When considering whether the invention defined in a claim of an application is an obvious variation of the invention defined in a claim of a patent, the disclosure of the patent may not be used as prior art." As pointed out by the Examiner, the claims of the cited patent do not recite a first and second electrode or an AC/DC voltage and thus cannot alone render the instant claims obvious. Accordingly, withdrawal of the rejection is respectfully requested.

U.S. Patent No. 6,248,229

Claims 19-31 and 33-40 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 11-21 of U.S. Patent 6,248,229. Applicant's respectfully traverse the propriety of this rejection. The claims of U.S. Patent 6,248,229 are directed to compositions and apparatus for the detection of target analytes via changes in solvent reorganization energy that occur upon binding of the target. Consequently, the claims of the cited patent disclose a binding ligand with a covalently attached solvent accessible transition metal complex. In contrast to the Examiner's argument, such complexes are distinct chemical entities having no relation to the self-assembled monolayers of the instant claims. Accordingly, as the claims of the cited patent do not render the instant claims obvious, withdrawal of the rejection is respectfully requested.

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CONCLUSION

Applicants respectfully submit that the claims are in condition for allowance and early notification to that effect is respectfully requested. Please direct any calls in connection with this application to the undersigned attorney at (415) 781-1989.

Respectfully submitted,

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